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Association of central serous chorioretinopathy in young adults with consumption of energy drinks

Raghav Rushi Bondalapati, Sailaja Bondalapati

ABSTRACT

To report the outcomes and association of energy drinks with vision changes and central serous chorioretinopathy in young adults. Retrospective observational analysis of 3 eyes of 3 young adults with significant social history of using energy drinks with high doses of caffeine and taurine presenting with sudden visual changes and central serous chorioretinopathy. All 3 patients are in the age range of 25 to 40 years of age with no past medical or ocular history. They all endorsed some stress but nothing unusual although all are consuming energy drinks with beyond the recommended dose of caffeine per day. Energy drinks include 5-hour energy drinks, Celsius drinks, and Red Bull energy drinks. They presented with acute changes in vision with visual acuity ranging from 20/40 to 20/60 given the size of the serous detachment. The Fundoscopic exam was positive for blunted foveal reflex with elevation of macula consistent with subretinal fluid. Optical coherence topography (OCT) confirmed the sensory detachment of the retina which was used for diagnosis, management, and follow-up care of the patients. The patients were followed monthly for six months with visual acuity, dilated fundus exam, and macular OCT. The primary treatment for all the patients was to stop and avoid energy drinks. In all patients the subretinal fluid regressed in six weeks to three months and vision was improved to baseline. We report on our cases with a review of current literature.

Keywords: Caffeine, Central serous chorioretinopathy, Energy drinks, Photodynamic therapy, Pigment epithelial detachment

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INTRODUCTION

Central serous chorioretinopathy (CSCR) is an ocular condition that is commonly associated with macular pathology, usually characterized by an accumulation of fluid beneath the retina. Notably, CSCR affects males in the 20–50 age group, thus suggesting a relation between the disorder and hormonal factors [1]. Patients with CSCR typically present with a wide variety of visual symptoms including central scotoma with vision loss, micropsia, metamorphopsia, decreased contrast sensitivity, and color saturation [1]. Studies have shown that 20% of patients may have macular detachment with persistent vision changes for six months and may be left with some degree of visual impairment such as micropsia or reduced color perception [2].

Quite a few factors have been attributed to the etiology of CSCR, including stress, corticosteroid use, both endogenous and exogenous steroid use, and systemic conditions including hypertension and sleep apnea [3]. Physiologically, it is the result of impairment to the retinal pigment epithelium (RPE), leading to accumulation of subretinal fluid which is clinically diagnosed with an eye exam and macular OCT. The disease may appear as either an acute or chronic type, the latter carrying the risk of a possible long-term visual deficit. The treatment modalities range from observation for spontaneous resolution, medical management with

mineralocorticoids, anti-vascular endothelial growth factor (VEGF) agents in selected cases with coexisting choroidal neovascularization and laser procedures as photodynamic therapy (PDT) [4].

CASE SERIES

Case 1

A 36-year-old Hispanic male presented with acute onset of monocular blurry vision in the right eye which progressively got worse in the following two days. He described his vision as a dark area in the center of his vision. He reported family history of glaucoma otherwise negative for other ophthalmic history. He denied unusual stress and any form of steroid use including inhalers and topical creams. He also denied usage of erectile dysfunction drugs. No history of autoimmune conditions. The patient was a car mechanic who worked for long hours and consumed five of 5-hour energy drinks to keep up with the work schedule.

Case 2

A 42-year-old Caucasian male who worked in a restaurant presented with acute onset of blurry vision in the left eye. He denied trauma and contact lens use. He had no past medical or family history of ophthalmic conditions. He denied recent steroid use but reported drinking 3 Celsius drinks per day with 2 cups of coffee.

Case 3

Another 36-year-old African American male with no past medical history or ophthalmic history presented with acute onset of blurry vision with central scotoma. He reported drinking 3–5 Red Bull Energy drinks to keep up with his work. He also denied any significant history that could contribute to the subretinal fluid.

Examination

The patient in case 1 presented with visual acuity (VA) of 20/60 in the right eye. His fundus exam and OCT are consistent with central subfoveal and subretinal fluid (Figure 1A). The patient in case 2 presented with VA of 20/40 in the left eye. His fundus exam and OCT show subretinal fluid in the fovea extending into the optic nerve but no optic pit noted (Figure 2A). The patient in case 3 also presented with VA of 20/40 with subretinal fluid involving fovea and extending into the temporal retina (Figure 3A). Intraocular pressures were within normal limits in all 3 patients with normal vision in the contralateral eye. Extraocular motility was full in all gazes with no eyelid ptosis and no afferent pupillary defect. On dilation, optic nerves appeared to be normal with a normal cup-to-disc ratio in both eyes (OU). The fundus exam revealed oval shaped neurosensory detachment without hemorrhage in all patients in the affected eye. Fluorescein angiography (FA) was not performed as there was no concern for other conditions such as autoimmune retinopathy, polypoidal chorioretinopathy, ocular tumors, optic nerve pit, or macular degeneration. Given the demographics of the patients, acute symptoms, social history, and clinical presentation, the diagnosis of central serous chorioretinopathy (CSCR) was considered and confirmed with OCT.

The first line treatment for CSCR is observation for spontaneous resolution. All patients were recommended to stop consuming energy drinks and caffeine immediately. The patients were followed for six months with monthly appointments for VA check and dilated fundus exam with OCT. There was a total resolution of subretinal fluid in six weeks (Figure 1B) in case 1, in three months in case 2 (Figure 2B), and in six months in case 3 (Figure 3B), and vision was improved to baseline.

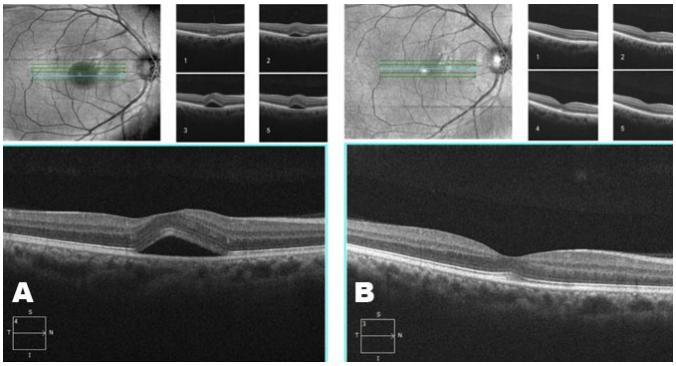

Figure 1: (A) Shows baseline OCT of a patient with subfoveal fluid who was consuming five of 5-hour energy drinks in a day. (B) Follow-up OCT image after six weeks of stopping the consumption of 5-hour energy drink shows resolution of subfoveal fluid.

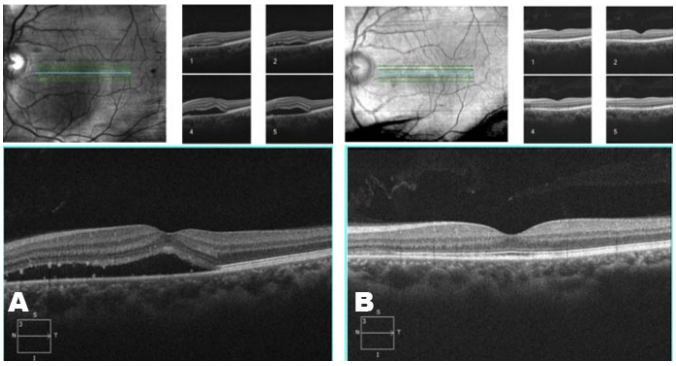

Figure 2: (A) Shows baseline OCT of a patient with subretinal fluid extending into the nasal fovea who was consuming Red Bull energy drinks with two cups of coffee. (B) Follow-up OCT image after three months of stopping the consumption of Red Bull energy drinks shows resolution of subretinal fluid.

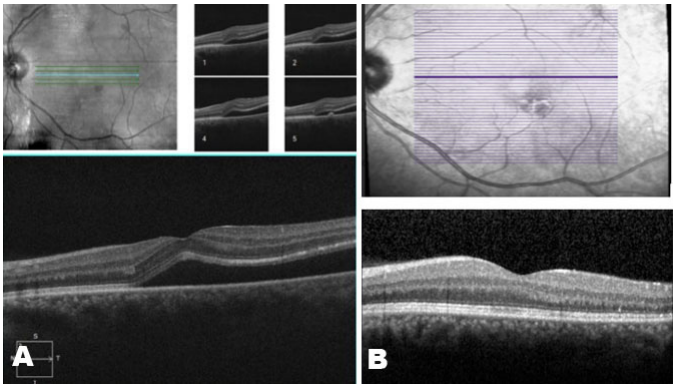

Figure 3 (A): Shows baseline OCT of a patient with subretinal fluid who was consuming Celsius drinks. (B) Follow-up OCT image after six months of stopping the consumption of Celsius drinks resolution of subretinal fluid.

DISCUSSION

As per the Food and Drug Administration, the recommended dose of caffeine ranges between 200 and 400 mg/day (approximately two to four cups of regular coffee) [5, 6]. Consumption of caffeine greater than approximately 500–600 mg/day is considered as an abuse and is associated with cardiac dysrhythmia, psychological alterations, dehydration, and in extreme cases, death [5, 6]. As per the ingredients, a 5-hour energy drink contains 230 mg of caffeine, a 12-ounce Celsius drink contains 200 mg of caffeine, and Red Bull drink has 102 mg of caffeine. Overconsumption of these drinks leads to overdose of caffeine which can lead to toxic effects on the body leading to visual changes. In the cases presented above, the patients have been consuming excess amounts of caffeine which have an association with endogenous steroid production in the body [7]. Patients with CSCR were found to have elevated endogenous cortisol levels which may lead to reduction in choroidal blood flow and increased intraluminal pressure in the surrounding capillaries. This results in hyperpermeability of the RPE leading to decompensation and detachment [7].

Central serous chorioretinopathy primarily demonstrates in the macular region of the retina. Clinical exam often reveals a well-circumscribed, round, or oval shaped serous retinal elevation in the macula which can be evidenced on OCT imaging as neurosensory retinal detachment with clear space between the inner retina and the retinal pigment epithelium (RPE). Fluorescein angiography (FA) shows one or more focal points of fluorescein leakage at the level of the RPE, often described as “smokestack” or “inkblot” pattern [8]. Indocyanine green angiography (ICGA), although not used very commonly, may reveal dilated choroidal vessels, choroidal lobular ischemia, and areas of choroidal hyperpermeability, supporting the theory of underlying choroidal dysfunction [9].

When making a diagnosis of CSCR, it may be confused with other diseases. For cases of bullous CSCR (which is usually seen in patients on systemic steroids), where a significant amount of subretinal fluid is found, can be mistaken for rhegmatogenous retinal detachments. Several associations for bullous CSCR include history of kidney disease or history of autoimmune disease [10]. In both acute and chronic cases that have resolved, the only clue that may be present on examination is macular retinal pigment epithelium (RPE) mottling. A thorough history, detailed examination, and appropriate imaging and laboratory tests can help differentiate these diagnoses.

Treatment approaches for CSCR depend on chronicity and severity. In acute cases, conservative measures such as lifestyle modification, stress reduction, and aborting unnecessary use of exogenous steroids, have led to spontaneous resolution [1]. For those with chronic cases, medical management with mineralocorticoid receptor antagonists, especially eplerenone or spironolactone, has shown promising results in some studies [11]. Photodynamic therapy (PDT) using verteporfin has been effective in reducing choroidal hyperpermeability and resolving subretinal fluid [12]. Focal laser photocoagulation might be an option for addressing extrafoveal leakage points [1].

CONCLUSION

The purpose of this paper to bring the adverse effects of overconsumption of caffeine in the form of energy drinks in young adults and review the diagnostic and treatment modalities of central serous chorioretinopathy.

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Author Contributions
Raghav Rushi Bondalapati – Conception of the work, Design of the work, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Sailaja Bondalapati – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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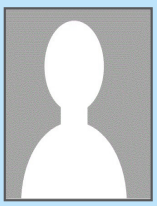

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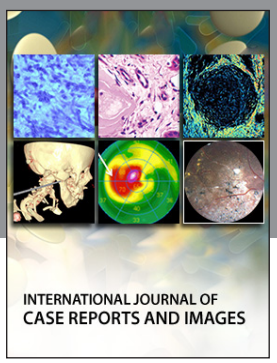

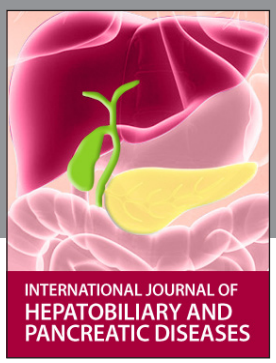

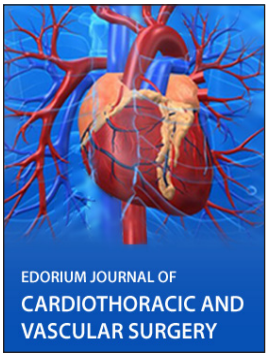

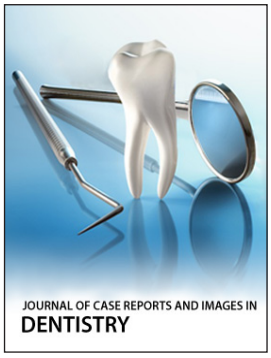

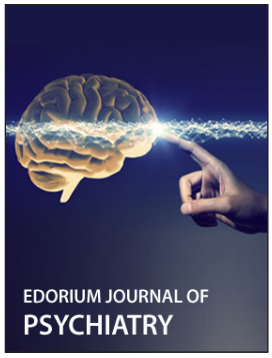

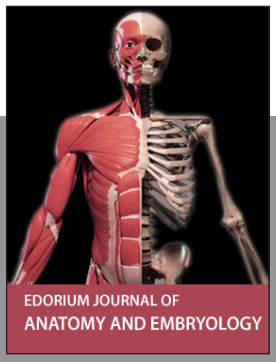

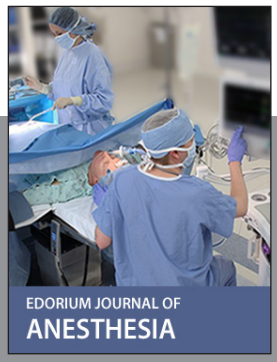

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